

IN THE CLAIMS:

Please **cancel** claims 1-18 without prejudice.

1-18 (Canceled)

19. (Original) A diffusion barrier comprising a plurality of stacked sub-layers, each sub-layer having a thickness predetermined to inhibit the formation of a crystalline lattice, to inhibit diffusion of a chemical species through the diffusion barrier.

20. (Original) A diffusion barrier as in claim 19, wherein the sub-layers are comprised of alternating layers of at least two different materials.

21. (Original) A diffusion barrier as in claim 20, where one of the materials is scandium (Sc).

22. (Original) A diffusion barrier as in claim 20, where one of the materials is copper (Cu).

23. (Original) A diffusion barrier as in claim 20, where one of the materials is yttrium (Y).

24. (Original) A diffusion barrier as in claim 20, where one of the materials is lanthanum (La)

25. (Original) A diffusion barrier as in claim 20, where one of the materials is tantalum (Ta).

26. (Original) A diffusion barrier as in claim 20, where one of the materials is a metal nitride.

27. (Original) A diffusion barrier as in claim 20, where one of the materials is an oxide.

28. (Original) A diffusion barrier as in claim 20, wherein the at least two materials selected to comprise the sub-layers are substantially immiscible.

29. (Original) A diffusion barrier as in claim 20, wherein the at least two materials selected to comprise the sub-layers exhibit mutual adhesion.

30. (Original) An integrated circuit comprising a substrate, having an electrically conductive feature disposed on said substrate, further comprising a diffusion barrier interposed between said substrate and said electrically conductive feature, said diffusion barrier comprising a plurality of stacked sub-layers, each sub-layer having a thickness predetermined to inhibit the formation of a crystalline lattice.

31. (Original) An integrated circuit as in claim 30, where at least one of said sub-layers is comprised of a metal.
32. (Original) A circuit structure comprising a substrate and an electrical interconnect comprised of copper (Cu), further comprising a diffusion barrier interposed between said substrate and said electrical interconnect, said diffusion barrier comprising a plurality of stacked sub-layers.
33. (Original) A circuit structure as in claim 32, where said sub-layers are comprised of copper (Cu) and tantalum (Ta).
34. (Original) A circuit structure as in claim 32, where said sub-layers are comprised of scandium (Sc) and tantalum (Ta).
35. (Original) A circuit structure as in claim 32, where said sub-layers are comprised of yttrium (Y) and tantalum (Ta).
36. (Original) A circuit structure as in claim 32, where said sub-layers are comprised of lanthanum (La) and tantalum (Ta).
37. (Original) A circuit structure as in claim 32, where at least one of the sub-layers is comprised of a metal nitride.

38. (Original) A multilayer diffusion barrier comprised of atomically thin films in which the surface adhesion of each interface inhibits the formation of a lattice in the bulk of the individual film layers, inhibiting diffusion across the barrier.

39. (Original) A multilayer diffusion barrier as in claim 38, where the films thickness is in a range of about two atoms to about five atoms.

40. (Original) A multilayer diffusion barrier as in claim 38, where the films thickness is in a range of about 0.4 nanometers to about 1.5 nanometers.

41. (Original) A multilayer structure comprised of three or more sub-layers, wherein the interface of each of the sub-layers dominates the lattice formation on the sub-layers, preventing the formation of a lattice and grain boundaries, to inhibit diffusion of a chemical species through the barrier.

42. (Original) A multilayer structure as in claim 41, where each of the sub-layers is comprised of a metal.

43. (Original) A multilayer diffusion barrier for inhibiting diffusion of chemical species there through, comprising a plurality of stacked layers comprised of alternating films of at least two different metals, the thickness of each of said films being predetermined to substantially eliminate work hardening.